

NODE 1/PMA 1 SHELL WARMUP

1. DOCUMENT HEATER POWER ALLOCATION FOR WARMUP

NOTE

The heater power allocation recorded in this step is the total power available to the US segment minus the current housekeeping power.

√MCC for heater power allocation

Record heater power allocation: _____ W

PCS

2. NODE 1/PMA 1 SHELL HEATER PRIORITIZATION

Node 1: TCS

NODE1: TCS

NOTE

Node 1 and PMA 1 Heaters are reconfigured at four-hour intervals based on shell temperature and heater power allocation. The coldest areas of the PMA 1 or Node 1 Shell will be given the highest priority when heaters are enabled.

Enter a temperature reading for each Node 1 and PMA 1 Shell Heater in Table 1. For heaters with two temperature sensors, only the coldest temperature reading should be entered in the table.

Rank Node 1 and PMA 1 Shell Heaters from coldest to warmest and enter the rankings in Table 1. For heaters with identical temperatures, place heaters with lower power levels highest in the ranking.

In the priority order documented in Table 1, select a group of heaters that can be commanded to the “Enabled to Operate” state within the heater power allocation recorded in step 1.

NOTE

If a given heater will cause the total heater power to exceed the power allocation documented in step 1 then that heater should be skipped and the next heater in priority order should be compared to the power allocation. All PMA 1 and Node 1 Shell Heaters should be evaluated in priority order.

3. INHIBIT PMA 1 AND NODE 1 HEATERS NOT SELECTED FOR WARMUP

NOTE

This step inhibits Node 1 and PMA 1 Shell Heaters which are Enabled to Operate but have not been selected for the next four-hour warmup period.

PCS

Node 1: TCS

NODE1: TCS

If any PMA1(NODE1) Htr[X]A(B) not selected in step 2 is Ena Opr
sel PMA1(NODE1) Htr[X]A(B) [X] = as required

sel PMA1(Nod1) Htr[X]A(B) Htr Commands

PMA1(Nod1) Htr[X]A(B) COMMANDS

cmd Inh Execute

PMA1(Nod1) Htr[X]

✓PMA1(Nod1) Htr[X]A(B) Availbty - Inh

Repeat

4. ENABLE TO OPERATE PMA 1 AND NODE 1 HEATERS SELECTED FOR WARMUP

NOTE

This step enables Node 1 and PMA 1 Shell Heaters which are Inhibited but have been selected for the next four-hour warmup period.

PCS

Node 1: TCS

NODE1: TCS

If any PMA1(NODE1) Htr[X]A(B) selected in step 2 is Inh

sel PMA1(Nod1) Htr[X]A(B) Htr Commands [X] = as required

PMA1(Nod1) Htr[X]A(B) COMMANDS

cmd Ena Opr Execute

PMA1(Nod1) Htr[X]

✓PMA1(Nod1) Htr1A(B) Availbty - Ena Opr

Repeat

Wait 4 hours and repeat steps 2 --- 4 until all Node 1 and PMA 1 Shell Temperatures are $\geq 18^{\circ} \text{ C}$.

5. INIHIBIT A HEATERS AND ENABLE TO OPERATE B HEATERS FOR NODE 1/PMA 1 SHELL TEMPERATURE MAINTENANCE

NOTE

Step 5 should be executed only after all PMA 1 and Node 1 Shell Temperatures are $\geq 18^{\circ} \text{ C}$.

PCS

Node 1: TCS

NODE1: TCS

If any PMA1(NODE1) Htr[X]A not Inh
sel PMA1(Nod1) Htr[X]A Htr Commands [X] = as required

PMA1(Nod1) Htr[X]A COMMANDS

cmd Inh Execute

PMA1(Nod1) Htr[X]

$\sqrt{\text{PMA1(Nod1) Htr[X]A Availbty - Inh}}$

Repeat

If any PMA1(Nod1) Htr[X]B not Ena Opr
sel PMA1(Nod1) Htr[X]B Htr Commands [X] = as required

PMA1(Nod1) Htr[X]B COMMANDS

cmd Ena Opr Execute

PMA1(Nod1) Htr[X]

$\sqrt{\text{PMA1(Nod1) Htr[X]B Availbty - Ena Opr}}$

Repeat

NOTE

The final configuration for PMA 1 and Node 1 Heaters is provided in Table 2. The setpoints and failure limits for each temperature sensor are not changed in this procedure and are provided in Table 2 for reference only.

TABLE 1. PMA 1/NODE 1 HEATER PRIORITIZATION

HEATER NAME	HEATER POWER (WATTS)	TEMP (deg C)	RANK	TEMP (deg C)	RANK	TEMP (deg C)	RANK
PMA 1 HTR 1A	68						
PMA 1 HTR 1B	68						
PMA 1 HTR 2B	68						
PMA 1 HTR 3A	68						
PMA 1 HTR 3B	68						
PMA 1 HTR 4A	68						
PMA 1 HTR 5A	68						
PMA 1 HTR 5B	68						
NODE 1 HTR 1A	274						
NODE 1 HTR 1B	174						
NODE 1 HTR 2A	110						
NODE 1 HTR 2B	80						
NODE 1 HTR 3A	180						
NODE 1 HTR 3B	180						
NODE 1 HTR 4A	180						
NODE 1 HTR 4B	180						
NODE 1 HTR 5A	180						
NODE 1 HTR 5B	180						
NODE 1 HTR 6A	180						
NODE 1 HTR 6B	180						
NODE 1 HTR 7A	99						
NODE 1 HTR 7B	99						
NODE 1 HTR 8A	66						
NODE 1 HTR 8B	66						
NODE 1 HTR 9A	121						
NODE 1 HTR 9B	145						

TABLE 2. PMA 1/NODE 1 HEATER CONFIGURATION TABLE
NODE 1/PMA 1 WARMUP

PMA 1 HEATERS - ALL TEMPS IN °C (°F)

HEATER	AVAILABILITY	UPPER SETPOINT	FAILURE UPPER LIMIT	LOWER SETPOINT	FAILURE LOWER LIMIT	CYCLIC LOAD DELTA
1A	Inh	23.9 (75)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
1B	Ena Opr	23.9 (75)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
2B	Ena Opr	23.9 (75)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
3A	Inh	23.9 (75)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
3B	Ena Opr	23.9 (75)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
4A	Inh	23.9 (75)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
5A	Inh	23.9 (75)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
5B	Ena Opr	23.9 (75)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)

NODE 1 HEATERS - ALL TEMPS IN °C (°F)

HEATER (SENSOR)	AVAILABILITY	UPPER SETPOINT	FAILURE UPPER LIMIT	LOWER SETPOINT	FAILURE LOWER LIMIT	CYCLIC LOAD DELTA
1A (Snsr 1)	Inh	25.6 (78)	45.0 (113)	23.3 (74)	-17.8 (0)	5.6 (10)
1A (Snsr 2)		25.6 (78)	45.0 (113)	23.3 (74)	-17.8 (0)	5.6 (10)
1B (Snsr 1)	Ena Opr	25.6 (78)	45.0 (113)	23.3 (74)	-17.8 (0)	5.6 (10)
1B (Snsr 2)		25.6 (78)	45.0 (113)	23.3 (74)	-17.8 (0)	5.6 (10)
2A	Inh	23.3 (74)	45.0 (113)	20.6 (69)	-17.8 (0)	5.6 (10)
2B	Ena Opr	23.3 (74)	45.0 (113)	20.6 (69)	-17.8 (0)	5.6 (10)
3A (Snsr 1)	Inh	23.9 (75)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
3A (Snsr 2)		23.9 (75)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
3B (Snsr 1)	Ena Opr	23.9 (75)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
3B (Snsr 2)		23.9 (75)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
4A	Inh	23.3 (74)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
4B	Ena Opr	23.3 (74)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
5A (Snsr 1)	Inh	24.4 (76)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
5A (Snsr 2)		24.4 (76)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
5B (Snsr 1)	Ena Opr	24.4 (76)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
5B (Snsr 2)		24.4 (76)	45.0 (113)	21.1 (70)	-17.8 (0)	5.6 (10)
6A (Snsr 1)	Inh	24.4 (76)	45.0 (113)	21.7 (71)	-17.8 (0)	5.6 (10)
6A (Snsr 2)		24.4 (76)	45.0 (113)	21.7 (71)	-17.8 (0)	5.6 (10)
6B (Snsr 1)	Ena Opr	24.4 (76)	45.0 (113)	21.7 (71)	-17.8 (0)	5.6 (10)
6B (snsr 2)		24.4 (76)	45.0 (113)	21.7 (71)	-17.8 (0)	5.6 (10)
7A(Snsr 1)	Inh	21.7 (71)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
7A (Snsr 2)		21.7 (71)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
7B (Snsr 1)	Ena Opr	21.7 (71)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
7B (Snsr 2)		21.7 (71)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
8A	Inh	21.7 (71)	45.0 (113)	19.4 (67)	-17.8 (0)	5.6 (10)
8B	Ena Opr	21.7 (71)	45.0 (113)	19.4 (67)	-17.8 (0)	5.6 (10)
9A	Inh	23.3 (74)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)
9B	Ena Opr	23.3 (74)	45.0 (113)	20.0 (68)	-17.8 (0)	5.6 (10)